



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
[www.uspto.gov](http://www.uspto.gov)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/597,811	04/13/2007	Spartak Gevorgian	0110-096	6634
42015	7590	06/04/2009	EXAMINER	
POTOMAC PATENT GROUP PLLC	TRAN, CHUC			
P. O. BOX 270	ART UNIT		PAPER NUMBER	
FREDERICKSBURG, VA 22404	2821			
	NOTIFICATION DATE		DELIVERY MODE	
	06/04/2009		ELECTRONIC	

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

tammy@ppglaw.com

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>
	10/597,811	GEVORGIAN ET AL.
	<b>Examiner</b>	<b>Art Unit</b>
	CHUC D. TRAN	2821

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 02 December 2008.  
 2a) This action is FINAL.                    2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 32,34-36,38 and 40-62 is/are pending in the application.  
 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_\_ is/are allowed.  
 6) Claim(s) 32,34-36,38,40,41,43-47,49,55-58 and 60-62 is/are rejected.  
 7) Claim(s) 42,48,50-54 and 59 is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |                                                                                        |                                                                   |
|----------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____ .                                    |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>4/9/09</u> .                                                  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### *Allowable Subject Matter*

1. The indicated allowability of claims 32, 34-36, 38, 40-55 and 59-62 are withdrawn in view of the newly discovered reference(s) to (USP. 6,175,337) and (USP. 6,664,734). Rejections based on the newly cited reference(s) follow.

### *Response to Arguments*

2. Applicant's arguments with respect to claims 56-58 have been considered but are moot in view of the new ground(s) of rejection.

### *Claim Rejections - 35 USC § 102*

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 32, 34-35, 38, 40-41, 43-47, 49, 56-58 and 60-62 are rejected under 35 U.S.C. 102(e) as being anticipated by Jasper, Jr. (USP. 6,664,734).

Regarding claim 32, Jasper teaches a tunable microwave/millimeter-wave arrangement in Fig. 9 and 10, comprising: a tunable impedance surface (MPC), wherein the tunable impedance surface comprises at least one of a Photonic Bandgap (PBG) structure (30) (Fig. 10, Col. 9, Line 41), the PBG comprising: at least one tunable ferroelectric layer (25) (Col. 11, Line 52), at least one first top metal layer (23), and at least one second metal layer (23) (Fig. 10), wherein the first and second layers are disposed on opposite sides of the at least one ferroelectric layer (25); at

least the first metal layer is patterned (designed) (Col. 9, Line 25); a dielectric permittivity (Col. 3, Line 27) of the at least one ferroelectric layer is dependent on a DC biasing voltage applied directly or indirectly to at least one of the first and second metal layers disposed on different sides of the at least one ferroelectric layer (Col. 11, Line 15); and at least the first metal layer (23) is patterned such that the first metal layer comprises an array of radiators (EM) (electromagnetic radiation) (Col. 10, Line 14) that form a two-dimensional (2D) (Col. 9, Line 42) array antenna (23) (Fig. 10) (the radiator (23) is explicitly act as antenna, same structure in prior art 6,175,337, Fig. 5, Col. 4, Line 60-64) and that are galvanically connected (dc connected) by via (24) connections through the ferroelectric layer (25) (Fig. 10) with a further second bottom metal layer (ground) (26) (Fig. 10, Col. 9, Line 29), and a DC biasing voltage is applied to the first metal layer (23) indirectly over the further second metal layer (23) (Fig. 10, Col. 11, Line 15).

Regarding claims 34 and 35, Jasper teaches the radiators (23) comprise patch resonator (resonant circuit) (Fig. 10, Col. 9, Line 46)

Regarding claim 38, Jasper teaches the 2D array antenna comprises a reflective antenna (Col. 9, Line 47).

Regarding claim 40, Jasper teaches that the second metal layer is patterned (designed) (Col. 9, Line 49), and includes openings that allow the via (24) connections to pass to the further second metal layer (23) (Fig. 10), and the DC biasing voltage is applied between the two second metal layers (Col. 11, Line 13) to vary an impedance of the array of radiators (Col. 3, Line 63).

Regarding claim 41, Jasper teaches that the via (24) connections are connected to center points of the radiators where a microwave current is substantially highest (Fig. 10, Col. 9, Line

Art Unit: 2821

27).

Regarding claim 43, Jasper teaches that varying (different) the DC biasing voltage (Col. 11, Line 13) varies (increase) an impedance of the array of radiators from inductive to capacitive (Col. 9, Line 44 and 55) (Col. 2, Line 6).

Regarding claim 44, Jasper teaches that a dielectric permittivity of the ferroelectric layer varies (increases) between approximately 225 and approximately 200 (Col. 11, Line 32).

Regarding claim 45, Jasper teaches that radiators are arranged in at least two two-dimensional (2D) arrays (Col. 9, Line 43), comprising the first and second metal layers (23) between which the ferroelectric layer (25) is disposed (Fig. 10), and the arrays comprise a transmission antenna (electromagnetic radiation transmission) (Col. 3, line 35).

Regarding claim 46, Jasper teaches that ferroelectric layers are provided on sides of the first and second metal layers (23) (Col. 9, Line 43) and are not in contact with the ferroelectric layer (by a thin insulator sheet) (Col. 10, Line 19).

Regarding claim 47, Jasper teaches that a DC voltage is applied to the metal layers (Col. 9, Line 35) and is provided to each individual radiator for changing a dielectric permittivity (constant) of the ferroelectric layer (Col. 10, line 59).

Regarding claim 49, Jasper teaches that the DC biasing voltage applied to each radiator is controllable via an impedance device (LC) (Col. 9, Line 55).

Regarding claim 56, Jasper, Jr. teaches a tunable microwave/millimeter-wave arrangement in Fig. 9 and 10, comprising: a tunable impedance surface (MPC), wherein the tunable impedance surface comprises at least one of a Photonic Bandgap (PBG) structure (30) (Col. 9, Line 23 and 41), the PBG structures comprising: at least one tunable ferroelectric layer

(25) (Fig. 10, Col. 9, Line 30) and (Col. 11, Line 53), at least one first top metal layer (23), and at least one second metal layer (23) (Fig. 10, Col. 9, Line 44), wherein the first and second metal layers (23) are disposed on opposite sides of the at least one ferroelectric layer (25) (Fig. 10, Col. 9, Line 42); at least one first metal layer and at least one second metal layer are patterned (designed) (Col. 9, Line 49); a dielectric permittivity (Col. 3, Line 27) of the at least one ferroelectric layer is dependent on a DC biasing voltage applied directly or indirectly to at least one of the first and second metal layers disposed on different sides of the at least one ferroelectric layer (Col. 10, Line 58); and the first and second metal layers (23) comprise a respective number of radiators (electromagnetic radiation) (Col. 10, Line 14), and the radiators (EM radiation (23) of the first and the second metal layers are differently arranged (Fig. 10).

Regarding claim 57, Jasper teaches that different coupling means (different voltage) are provided for the radiators of the first and second metal layers (Col. 11, Line 13-19).

Regarding claim 58, Jasper teaches that a DC biasing voltage is applied to the radiators of the first and second metal layers between (Col. 11, Line 13-19) to change a lumped capacitance (Col. 10, Line 60) and thereby a capacitive coupling between the radiators (Col. 9, Line 44).

Regarding claim 60, Jasper teaches that a spacing between adjacent radiators corresponds to a factor of about 0-1.5 times a wavelength (zero wavelength) of a microwave signal in the ferroelectric layer (Fig. 10).

Regarding claim 61, Jasper teaches that the arrangement comprises a three-dimensional tunable radiator array (Col. 10, line 6).

Regarding claim 62, Jasper teaches that a method of controlling microwave and millimeter- wave signals, comprising the step of changing at least one of a phase (Col. 11, Line 25) distribution of the signals reflected through the arrangement (Col. 9, Line 47).

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claim 36 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jasper, Jr. (6,664,734) in view of McKinzie, III (USP. 6,525,695).

Regarding claim 36, Jasper, Jr reference teaches every feature in the claimed invention excluding the patch resonator are circle. McKinzie reference teaches in Fig. 12 the patch resonators (1210) are circle (McKinzie, Fig. 12). It would have been obvious to incorporate the teaching of McKinzie into the teaching of Jasper , Jr for tuning the resonant frequency in order to provide a higher gain, higher rate power and higher efficiency of the TWT.

7. Claim 55 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jasper, Jr. (USP. 6,664,734) in view of Jasper, Jr. et al (USP. 6,175,337).

Regarding claim 55, Jasper, Jr reference teaches every feature in the claimed invention including the DC biasing voltage ranges from 0 volts and several thousand volts (Jasper (734), Col. 11, Line 14), but excluding a thickness of the ferroelectric layer is between about 1 micrometer and several millimeters. Jasper (337) reference teaches a thickness of the ferroelectric layer is between about 1 micrometer and several millimeters (1.6 inches, about 40

millimeter) (Jasper (337), Col. 4, line 1). It would have been obvious to incorporate the teaching of Jasper (337) into the teaching of Jasper (6,664,734) for reducing electromagnetic wave in order to provide a higher gain, higher rate power and higher efficiency of the TWT.

***Allowable Subject Matter***

8. Claims 42, 48, 50-54 and 59 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Inquiry***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to CHUC D. TRAN whose telephone number is (571)272-1829. The examiner can normally be reached on M-F Flex hours.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Douglas W. Owens can be reached on (571) 272-1662. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Chuc D Tran/  
Examiner, Art Unit 2821

/Douglas W Owens/  
Supervisory Patent Examiner, Art Unit 2821  
June 1, 2009